County, which borders on the Sabine River, and suffered most from the floods. As this service has no rain gages in that section, it is impossible to give the amounts of precipitation; but that the downpour was torrential is evident from the havoc wrought. From inquiries made at 60 or more post offices the total depths of rainfall collected in tubs, barrels, and other receptacles were variously estimated at from 5 to 36 inches. At Newton, the county seat of Newton County, the total amount given was 36 inches. This seems largely overestimated, but as the amounts given were decreasing radially from this point it appears to have been in the center of the deluge. The nearest rainfall stations surrounding the flooded area report the following amounts for the 23d–24th: San Augustine, 2.06; Lufkin, 1.07; Rockland, 3.55; Carmona, 1.98; Liberty, 3.29; and Beaumont, 2.42 inches.

The flooded area is traversed by numerous small streams and creeks draining into the Neches or Sabine Rivers. The land is level in the south and becomes rolling and hilly in the north and forms part of the timber district of Texas.

The damage from the rains affected all industries. Farm lands were badly washed and had to be replanted and some were entirely ruined for the season, buildings and fences and numerous bridges were swept away, electric wires were prostrated, and traffic was interrupted. Many miles of railroad tracks were under water and badly damaged or washed away, and lumber mills had to suspend operations. The rains began on the evening of April 23 and before midnight small streams and creeks were overflowing and all low places flooded. Two negro children perished in the flood and a large number of horses, cattle, and pigs were drowned.

So far as reported the aggregate loss is estimated at $1,143,000, distributed as follows: Sabine County, $5,000; Newton County, $1,005,000; Jasper County, $103,000; and Hardin County, $30,000. The loss is probably much greater, as the damage extended into other counties, and a large number of correspondents, while conceding heavy damage, did not venture to give an estimate.

The rains occurred in the southeastern quadrant of a general barometric depression that extended across the United States from the Rio Grande to Manitoba on the morning of April 23 and gave general rains in Texas and the western cotton belt.

EFFECT OF DUST ON THE MELTING OF SNOW.

By HARRIS A. JONES, Observer, Wagon Wheel Gap, Colo.

During the night of March 18–19, 1913, there was a fall of 0.6 inch of snow at this station, but not proverbially pure, as there was much dust mixed with it. A 2-quart pan packed full of snow showed, after the snow had melted and the dust precipitated, about an eighth of an inch of sediment on the bottom of the pan. From the recorded direction of the wind it was evident that the dust had come across the Continental Divide from the desert plains of New Mexico. The storm continued for several days, without further deposit of dust, however, and the total depth of snowfall measured 8.9 inches. At the end of the storm the dust layer was about 6 inches beneath the surface. This dust blanket very effectively intercepted insolation, which spends itself not at the surface but pierces into the snow, decreasing in intensity with the increase of depth. Within two or three days after the storm, the upper layers of snow had melted and the dust blanket was exposed at the surface, and all fresh snow that fell since melted quickly into the lower layers and kept the dust persistently at the surface.

No effect was felt on our streams from surface run-off, as automatically recorded in our experimental work, until near the end of the month. The melting had had the effect mainly of increasing the density of the lower layers of snow. At the close of the month, however, it was evident that the melting season was nearly a month in advance of the normal, despite the fact that the mean temperatures were below the seasonal average; and much of this advance is attributed to the presence of the dust blanket.

CLOUD-SHADOW PROJECTION.

By HOWARD H. MARTIN, Assistant Observer, Fort Worth, Tex.

A peculiar and most interesting observation of the projection of cloud shadows was made at Fort Worth, Tex., on the evening of April 8, 1913. The phenomenon consisted essentially of a distinct and vivid shadow of an unseen prominence of cloud, projected over the main body of which it was a part, and screened upon a patch of clear sky at about 35° altitude.

The day had been generally cloudy and sultry, with occasional traces of precipitation. During the morning the higher clouds had moved steadily from the south and southwest, but the passage of a dry thunderstorm in the afternoon changed the direction to southeast. The lower clouds moved from the southeast during the morning hours, changing to southwest and west by night.

At 6.30 p. m., local time, a great bank of cumulo-nimbus presented itself in the western sky directly in the path of the sun. The top of this mass was of the usual "steam column" or thunderhead type, and to the southward dense streaks of falling rain were to be seen. To the eastward lay a greater bank of alto-stratus, and this, together with the western cloud, formed an admirable background for the phenomenon in the clear spot overhead.

As the sun sank lower behind the cloud a shadow tip, surrounded by a faint penumbra, forced its way into the clear sky. At the moment of maximum intensity the ghostly shadow reared fully 15° above the parent cloud, a sight not to be forgotten. Surrounding the penumbra was a faint "glory," daintily and lightly colored.

The duration of this phenomenon was comparatively short. By 6.45 p. m. the shadow had disappeared and the cloud bank greatly diminished in size, but the streaks of falling rain had become more intensified and were now accompanied by an occasional flash of zigzag lightning.

The sun set cloudy, sinking out of the cumulo-nimbus bank into a lower bank of alto-stratus. The phenomenon was followed within about two hours by a thunderstorm and copious precipitation. Although such phenomena are probably not rare, yet circumstances favorable to their observation are sufficiently so to render them worthy of note.

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